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Residential fire solutions in the building sector

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Residential fires are still frequently occurring in the world, which have the potential growing into disaster that can cause many casualties. As stated in literature and policy papers, biomaterials are needed to obtain more sustainable solutions in the building sector. All building materials need to sustain a series of fire testing, and the application of coatings might be needed before the materials are acceptable to use. This is in order to establish a high safety level with concern to fire, especially in the case of biomaterials, as they have to be considered combustible.

Hence, the application of flame-retardants is a common solution, but many flame-retardants have adverse effects to human health and the environment. Therefore, the fire behaviour of the materials in combination with flame-retardants need to be studied. An example are boron compounds, which are widely used as flame-retardants to reduce the ignitibility of biomaterials, despite the fact that a number of these compounds are on the ECHA list of candidates of very high concern for authorization.

It is a well-established fact that borates tend to wash out, and may impact the surrounding environment. Therefore, its application may become questioned in the future.

Hence, in the current work, sustainable solutions using biomaterials in construction with a focus on fire safety are examined.

As part of a starting PhD project, different methods for production and fire testing of bio-based materials and composites are reviewed including wooden products (e.g. board, fibre, LVL (Laminated Veneer Lumber)). Hereunder, the fire properties of bio-based resins as lignin and furfuryl-alcohol are investigated. The study provides basic information on the material's potential to give better products, i.a. to use less flame-retardants giving less adverse environmental effects.